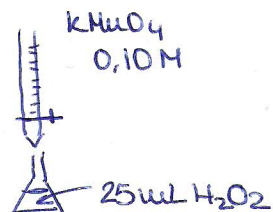


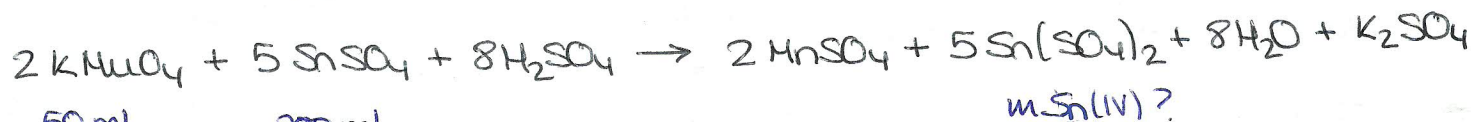
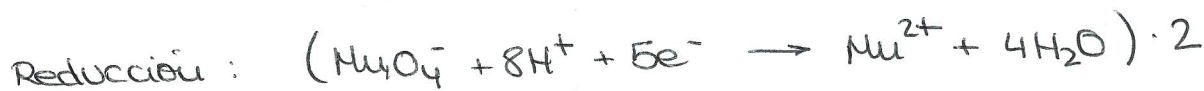
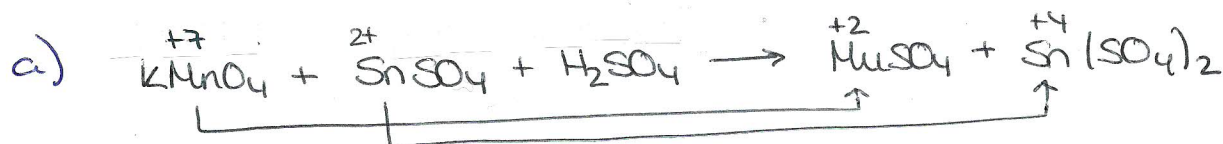
18) 25 mL  $\text{H}_2\text{O}_2$  ← medio ácido:  $\text{H}_2\text{SO}_4$   
 40 mL  $\text{KMnO}_4$  0,10 M  $c(\text{g/l})?$



$$40 \text{ mL } \text{KMnO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,10 \text{ mol } \text{KMnO}_4}{1 \text{ L } \text{KMnO}_4} \cdot \frac{5 \text{ mol } \text{H}_2\text{O}_2}{2 \text{ mol } \text{KMnO}_4} \cdot \frac{34 \text{ g } \text{H}_2\text{O}_2}{1 \text{ mol } \text{H}_2\text{O}_2} = 0,34 \text{ g } \text{H}_2\text{O}_2$$

$$M[\text{H}_2\text{O}_2] = 2 \cdot 1 + 2 \cdot 16 = 34 \text{ g/mol}$$

$$c(\text{g/L}) = \frac{0,34 \text{ g } \text{H}_2\text{O}_2}{25 \text{ mL}} \cdot \frac{1000 \text{ mL}}{1 \text{ L}} = 13,6 \text{ g } \text{H}_2\text{O}_2/\text{L}$$



b) 50 mL 0,20 M      200 mL 0,10 M

$$50 \text{ mL } \text{KMnO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,2 \text{ mol } \text{KMnO}_4}{1 \text{ L}} \cdot \frac{5 \text{ moles } \text{SnSO}_4}{2 \text{ mol } \text{KMnO}_4} = 0,025 \text{ mol } \text{SnSO}_4$$

(teóricos)

$$200 \text{ mL } \text{SnSO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,10 \text{ mol } \text{SnSO}_4}{1 \text{ L}} = 0,02 \text{ moles } \text{SnSO}_4 \Rightarrow \text{REACTIVO LIMITANTE}$$

(tengo)

$$M_m[\text{Sn}(\text{SO}_4)_2] = 118,7 + 32 \cdot 2 + 16 \cdot 8 = 310,7 \text{ g/mol}$$

$$1. \quad 200 \text{ mL SnSO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,1 \text{ mol SnSO}_4}{1 \text{ L}} \cdot \frac{5 \text{ mol Sn}(\text{SO}_4)_2}{5 \text{ mol SnSO}_4} \cdot \frac{310,7 \text{ g}}{1 \text{ mol Sn}(\text{SO}_4)_2} = 6,21 \text{ g Sn}(\text{SO}_4)_2$$

2. Cantidad inicial:

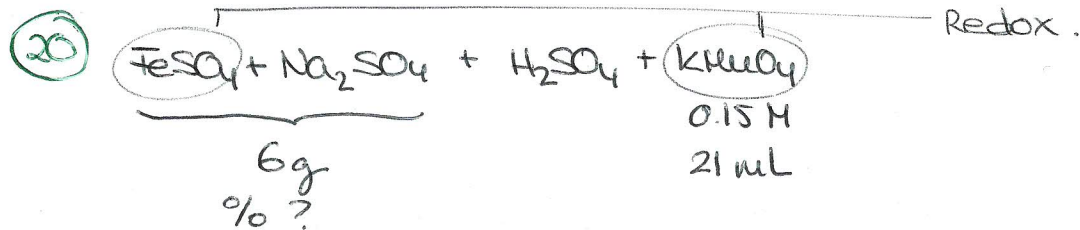
$$50 \text{ mL KMnO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,2 \text{ mol KMnO}_4}{1 \text{ L}} \cdot \frac{158 \text{ g}}{1 \text{ mol KMnO}_4} = 1,58 \text{ g KMnO}_4 \text{ iniciales}$$

$$M_m[\text{KMnO}_4] = 39 + 55 + 16 \cdot 4 = 158 \text{ g/mol}$$

Cantidad que reacciona:

$$200 \text{ mL SnSO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,10 \text{ mol SnSO}_4}{1 \text{ L}} \cdot \frac{2 \text{ mol KMnO}_4}{5 \text{ mol SnSO}_4} \cdot \frac{158 \text{ g}}{1 \text{ mol KMnO}_4} = 1,264 \text{ g KMnO}_4 \text{ reaccionan.}$$

$$1,58 - 1,264 = 0,316 \text{ g KMnO}_4 \text{ sobran.}$$

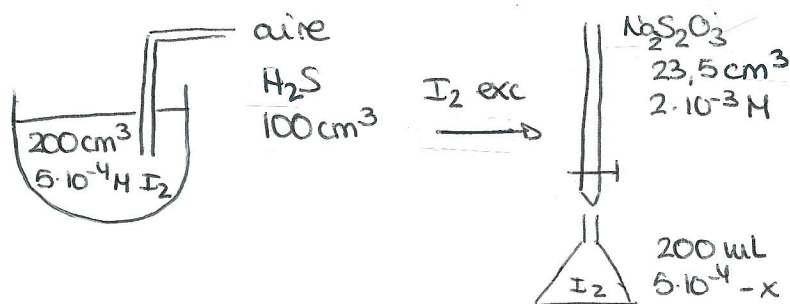


$$21 \text{ mL KMnO}_4 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,15 \text{ mol KMnO}_4}{1 \text{ L}} \cdot \frac{10 \text{ mol FeSO}_4}{2 \text{ mol KMnO}_4} \cdot \frac{151,8 \text{ g FeSO}_4}{1 \text{ mol FeSO}_4} = 2,39 \text{ g FeSO}_4$$

$$M_m[\text{FeSO}_4] = 55,8 + 32 + 4 \cdot 16 = 151,8 \text{ g/mol}$$

$$\frac{2,39 \text{ g FeSO}_4}{6 \text{ g mezcla}} \cdot 100 = 39,8 \% \text{ FeSO}_4$$

$$100 - 39,8 = 60,2 \% \text{ Na}_2\text{SO}_4$$



$$23,5 \text{ mL} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{2 \cdot 10^{-3} \text{ mol Na}_2\text{S}_2\text{O}_3}{1 \text{ L}} \cdot \frac{1 \text{ mol I}_2}{2 \text{ moles Na}_2\text{S}_2\text{O}_3} = 2,35 \cdot 10^{-5} \text{ moles I}_2$$

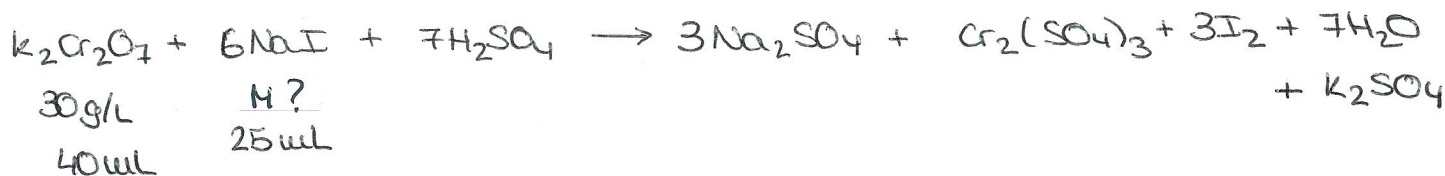
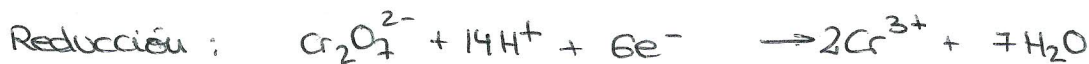
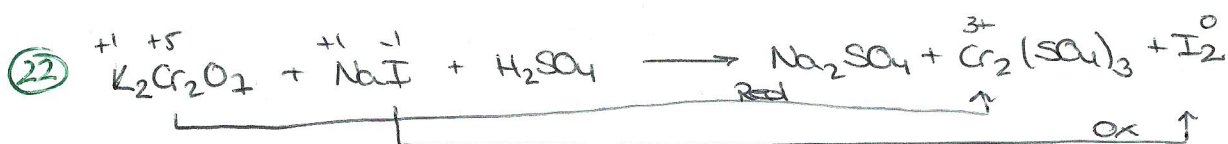
quedan sin reaccionar.

$$200 \text{ mL} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{5 \cdot 10^{-4} \text{ mol I}_2}{1 \text{ L}} = 10^{-4} \text{ moles I}_2 \Rightarrow 10^{-4} - 2,35 \cdot 10^{-5} = 7,65 \cdot 10^{-5} \text{ moles I}_2$$

reaccionan.

$$7,65 \cdot 10^{-5} \text{ mol I}_2 \cdot \frac{1 \text{ mol H}_2\text{S}}{1 \text{ mol I}_2} = 7,65 \cdot 10^{-5} \text{ mol H}_2\text{S del aire.}$$

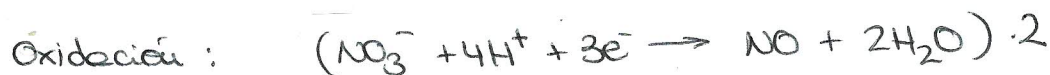
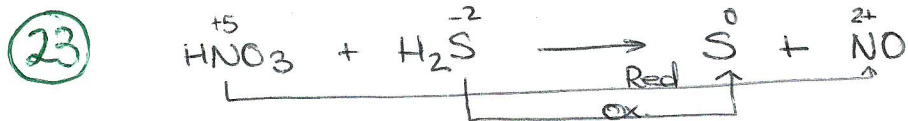
$$\frac{7,65 \cdot 10^{-5} \text{ mol H}_2\text{S}}{100 \text{ cm}^3 \text{ aire}} \cdot \frac{10^6 \text{ cm}^3 \text{ aire}}{1 \text{ m}^3 \text{ aire}} \cdot \frac{34 \text{ g H}_2\text{S}}{1 \text{ mol H}_2\text{S}} \cdot \frac{1000 \text{ μg}}{1 \text{ g}} = 26010 \text{ μg H}_2\text{S.}$$



$$40 \text{ mL K}_2Cr_2O_7 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{30 \text{ g K}_2Cr_2O_7}{1 \text{ L}} \cdot \frac{1 \text{ mol K}_2Cr_2O_7}{294 \text{ g K}_2Cr_2O_7} \cdot \frac{6 \text{ mol NaI}}{1 \text{ mol K}_2Cr_2O_7} = 0,024 \text{ mol NaI}$$



$$\frac{0,024 \text{ mol NaI}}{25 \text{ mL}} \cdot \frac{1000 \text{ mL}}{1 \text{ L}} = 0,98 \text{ M}$$



a)

$$300 \text{ mL HNO}_3 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,3 \text{ mol HNO}_3}{1 \text{ L}} \cdot \frac{3 \text{ mol H}_2\text{S}}{2 \text{ mol HNO}_3} = 0,135 \text{ mol H}_2\text{S}$$

$$PV = nRT \Rightarrow V = \frac{nRT}{P}$$

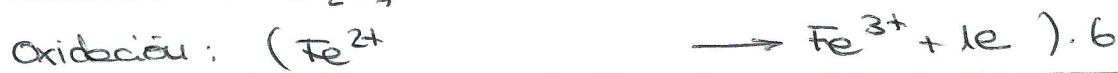
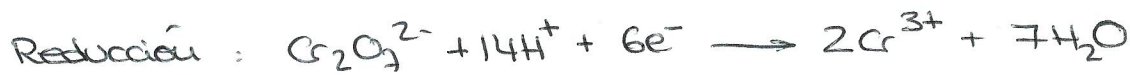
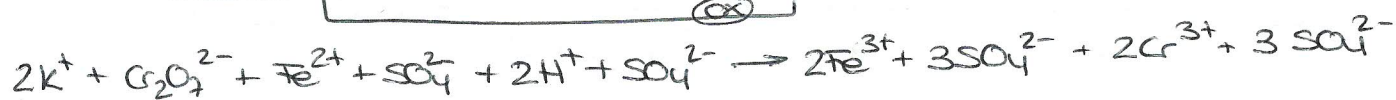
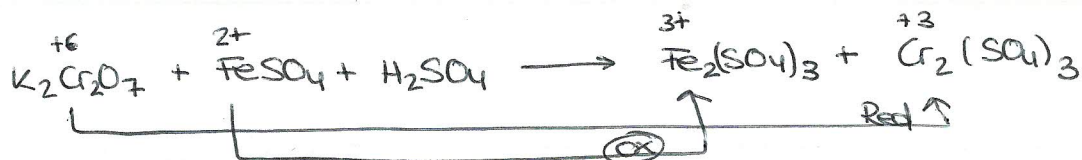
$$V = \frac{0,135 \text{ mol} \cdot 0,082 \frac{\text{atm} \cdot \text{L}}{\text{K} \cdot \text{mol}} \cdot 343,15 \text{ K}}{\frac{800}{760} \text{ atm}} = 3,6 \text{ L H}_2\text{S}$$

$$b) 300 \text{ mL HNO}_3 \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,3 \text{ mol HNO}_3}{1 \text{ L}} \cdot \frac{2 \text{ mol NO}}{2 \text{ mol HNO}_3} = 0,09 \text{ mol NO}$$

$$P \cdot V = n \cdot R \cdot T \Rightarrow V = \frac{n \cdot R \cdot T}{P}$$

$$V = \frac{0,09 \text{ mol} \cdot 0,082 \frac{\text{atm} \cdot \text{L}}{\text{K} \cdot \text{mol}} \cdot 343,15 \text{ K}}{\frac{800}{760} \text{ atm}} = 2,41 \text{ L NO}$$

(24)



4 g

Rto 75%.

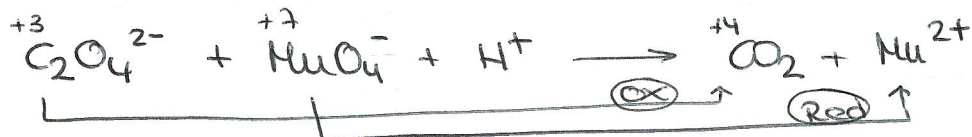
g?

$$4 \text{ g } \text{K}_2\text{Cr}_2\text{O}_7 \cdot \frac{1 \text{ mol } \text{K}_2\text{Cr}_2\text{O}_7}{294 \text{ g } \text{K}_2\text{Cr}_2\text{O}_7} \cdot \frac{1 \text{ mol } \text{Cr}_2(\text{SO}_4)_3}{1 \text{ mol } \text{K}_2\text{Cr}_2\text{O}_7} \cdot \frac{392 \text{ g } \text{Cr}_2(\text{SO}_4)_3}{1 \text{ mol } \text{Cr}_2(\text{SO}_4)_3} \cdot \frac{75 \text{ g reales}}{100 \text{ g teóricos}} = 4 \text{ g } \underline{\underline{\text{Cr}_2(\text{SO}_4)_3}}$$

$$M[\text{K}_2\text{Cr}_2\text{O}_7] = 39 \cdot 2 + 52 \cdot 2 + 16 \cdot 7 = 294 \text{ g/mol}$$

$$M[\text{Cr}_2(\text{SO}_4)_3] = 52 \cdot 2 + 32 \cdot 3 + 16 \cdot 12 = 392 \text{ g/mol}$$

(25)



200 mL

100 mL

V?

0,15 M

0,05 M

80°C

800 mmHg

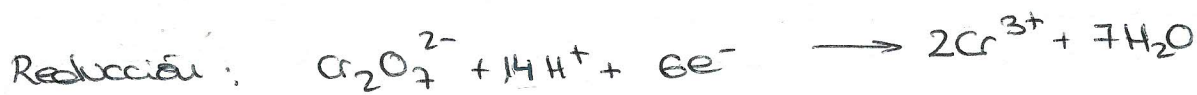
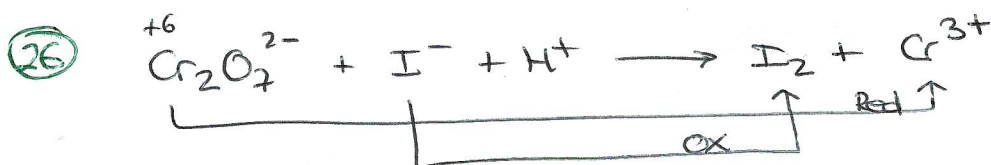
$$200 \text{ mL } \text{MnO}_4^- \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,15 \text{ mol } \text{MnO}_4^-}{1 \text{ L}} \cdot \frac{5 \text{ mol } \text{C}_2\text{O}_4^{2-}}{2 \text{ mol } \text{MnO}_4^-} = 0,075 \text{ mol } \text{C}_2\text{O}_4^{2-} \text{ (teóricos)}$$

$$100 \text{ mL } \text{C}_2\text{O}_4^{2-} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0,05 \text{ mol } \text{C}_2\text{O}_4^{2-}}{1 \text{ L}} = 0,005 \text{ mol } \text{C}_2\text{O}_4^{2-} \Rightarrow \text{REACTIVO (tengo) LIMITANTE.}$$

$$100 \text{ mL } \text{C}_2\text{O}_4^{2-} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0.05 \text{ mol } \text{C}_2\text{O}_4^{2-}}{1 \text{ L}} \cdot \frac{10 \text{ mol } \text{CO}_2}{5 \text{ mol } \text{C}_2\text{O}_4^{2-}} = 0.01 \text{ mol } \text{CO}_2$$

$$PV = nRT \quad ; \quad V = \frac{nRT}{P}$$

$$V = \frac{0.01 \text{ mol} \cdot 0.082 \frac{\text{atm} \cdot \text{L}}{\text{K} \cdot \text{mol}} \cdot 353,15 \text{ K}}{\frac{800}{760} \text{ atm}} = 0.27 \text{ L } \text{CO}_2 \quad (*)$$



V ?	100 mL
0.5 M	0.09 M

$$100 \text{ mL } \text{KI} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0.09 \text{ mol KI}}{1 \text{ L}} \cdot \frac{1 \text{ mol } \text{K}_2\text{Cr}_2\text{O}_7}{6 \text{ mol KI}} \cdot \frac{1 \text{ L}}{0.5 \text{ mol } \text{K}_2\text{Cr}_2\text{O}_7} \cdot \frac{1000 \text{ mL}}{1 \text{ L}} = 3 \text{ mL } \text{K}_2\text{Cr}_2\text{O}_7$$

(\*)

$$100 \text{ mL } \text{C}_2\text{O}_4^{2-} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} \cdot \frac{0.05 \text{ mol } \text{C}_2\text{O}_4^{2-}}{1 \text{ L}} \cdot \frac{2 \text{ mol } \text{MnO}_4^-}{5 \text{ mol } \text{C}_2\text{O}_4^{2-}} \cdot \frac{1 \text{ L}}{0.15 \text{ mol } \text{MnO}_4^-} \cdot \frac{1000 \text{ mL}}{1 \text{ L}} = 13.3 \text{ mL } \text{MnO}_4^-$$

$$200 \text{ mL} - 13.3 \text{ mL} = 186.7 \text{ mL de } \text{MnO}_4^- \text{ sobran.}$$